The Philosophy of Consensus: A Temporal Field Theory of Identity Unitary Evolution of Desire in Duration Space

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Abstract

This paper formalizes a field-theoretic approach to identity dynamics, where desires evolve as complex-valued functions over duration, now defined symmetrically across past and future. The fundamental equation $i\partial_t \Psi = \partial^2_{\Delta t} \Psi$ governs the unitary evolution of identity, treating duration $\Delta t \in (-\infty, \infty)$ as an independent dimension analogous to spatial position. This extended framework bridges physical conservation laws with phenomenological experience [3, 12], modeling identity as a coherent field that diffuses, rotates, and interferes across both past and future temporal horizons while preserving total salience. We derive the equation from first principles of information conservation and temporal symmetry, then demonstrate its implementation for personal alignment and decision-making within the full temporal continuum.

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1 Conceptual Framework

1.1 Desire Space as a Duration Field

Let the *desire space* be a Hilbert space of square-integrable complex-valued functions over duration offset $\Delta t \in \mathbb{R}$:

$$\mathcal{H} = \left\{ \Psi : \mathbb{R} \to \mathbb{C} \,\middle|\, \int_{-\infty}^{\infty} |\Psi(\Delta t)|^2 \, d(\Delta t) < \infty \right\}.$$

Each basis function $\phi_i(\Delta t)$ represents a core desire's distribution across **past and future** horizons [1, 20]. The total identity field is a superposition:

$$\Psi(t, \Delta t) = \sum_i a_i(t)\phi_i(\Delta t), \quad a_i(t) \in \mathbb{C},$$

where coefficients $a_i(t)$ evolve unitarily under the field equation. Here $\Delta t > 0$ represents future horizons (anticipation), $\Delta t < 0$ represents past horizons (memory/retrospection), and $\Delta t = 0$ represents the immediate present.

1.2 The Identity Field Equation

Identity evolves according to the unitary field equation:

$$\boxed{i\frac{\partial \Psi}{\partial t} = \frac{\partial^2 \Psi}{\partial (\Delta t)^2}}$$

(1)

This equation states that curvature in the full duration space drives phase evolution in chronological time, ensuring conservation of total identity salience across past and future:

$$\frac{d}{dt} \int_{-\infty}^{\infty} |\Psi(t, \Delta t)|^2 \, d(\Delta t) = 0.$$

1.3 Frequency as Value

In the plane-wave decomposition of the identity field,

$$\Psi(t, \Delta t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \bar{\Psi}(k, 0) e^{i(k\Delta t - \omega t)} dk,$$

the dispersion relation $\omega = k^2$ emerges from the field equation $i\partial_t \Psi = \partial^2_{\Delta t} \Psi$. Here, ω functions as the *temporal frequency* of a mode, dictating the rate at which its phase rotates in chronological time t.

Interpreted through the lens of value dynamics, ω serves as a quantitative measure of a desire's *value intensity* [23, 4]. Modes with higher ω oscillate more rapidly, corresponding to desires that

are more urgent, time-sensitive, or emotionally charged. Conversely, modes with lower ω evolve slowly, representing stable, enduring values that form the background of identity. This also aligns with Dewitt Henry Parker's definition as value as the satisfaction of desire.

This connection is further reinforced by recognizing that the Hamiltonian operator $\hat{H} = \partial^2_{\Delta t}$ generates time evolution, and its expectation value

$$\langle \hat{H} \rangle = \int_{-\infty}^{\infty} \Psi^* \partial^2_{\Delta t} \Psi \, d(\Delta t)$$

is conserved. In the Fourier domain, $\langle \hat{H} \rangle = \int_{-\infty}^{\infty} \omega |\bar{\Psi}(k)|^2 dk$, which is the weighted average of ω over the field's spectral composition. Thus, the total "value energy" of the identity field is the integrated product of spectral density and frequency, directly identifying frequency with value.

In practice, this means that the felt importance of a desire is encoded in its temporal frequency: high-value desires are those that demand rapid phase adjustment and are tightly wound in duration space, while low-value desires are more diffuse and evolve gradually. Monitoring the frequency spectrum of one's identity field can therefore provide insight into the distribution of personal value across temporal horizons.

1.4 Value Operators

Actions are represented by operators $\hat{V}_j$ on $\mathcal{H}$, which are multiplication by a complex function $v_j(\Delta t)$. The expected value of action j is:

$$\langle \hat{V}_j \rangle = \int_{-\infty}^{\infty} \Psi^*(t, \Delta t) \, v_j(\Delta t) \, \Psi(t, \Delta t) \, d(\Delta t) = \int_{-\infty}^{\infty} |\Psi(t, \Delta t)|^2 v_j(\Delta t) \, d(\Delta t).$$

This expectation value is generally complex. Its modulus $|\langle \hat{V}_j \rangle|$ quantifies the overall alignment of the action with the identity field, and its argument $\arg(\langle \hat{V}_j \rangle)$ indicates the temporal resonance of the action.

2 Implementation Protocol

2.1 Weekly Configuration

1. **Field Measurement** (Sunday 20:00): Estimate current $\Psi(t, \Delta t)$ through reflection on desires at horizons $\Delta t = \{-1 \text{ year}, -1 \text{ month}, -1 \text{ week}, -1 \text{ day}, 0, 1 \text{ day}, 1 \text{ week}, 1 \text{ month}, 1 \text{ year}\}$. Negative horizons capture how past experiences and memories shape current desire configurations.

2. **Field Evolution**: Solve Equation 1 numerically for the coming week: $\Psi(t + \delta t, \Delta t) = e^{-i\delta t \, \partial^2_{\Delta t}} \Psi(t, \Delta t)$.

3. **Action Scoring**: Compute complex expectation values: $\text{Score}_j = \langle \hat{V}_j \rangle = |\text{Score}_j| e^{i\phi_j}$. Modulus gives priority; phase indicates optimal timing and relationship to past patterns.

4. **Temporal Scheduling**: Allocate time proportionally to $|\text{Score}_j|$, grouping phase-coherent actions while considering resonances with past experiential patterns.

2.2 Example Configuration

The symmetric duration horizons capture when each desire feels most salient relative to the present moment, influenced by both memory and anticipation. The identity field $\Psi(t, \Delta t)$ has amplitude $|\Psi|$ and phase $\arg(\Psi)$ at each Δt. For each action j, we define a complex impact function $v_j(\Delta t) = f_j(\Delta t)e^{i\theta_j}$, where $f_j(\Delta t)$ is a real, non-negative function representing the strength of the action's impact at horizon Δt, and θ_j is a constant phase that indicates the optimal timing for the action. The scoring of an action is then given by the complex expectation value:

$$\text{Score}_j = \int_{-\infty}^{\infty} |\Psi(t, \Delta t)|^2 v_j(\Delta t)\, d(\Delta t) = e^{i\theta_j} \int_{-\infty}^{\infty} |\Psi(t, \Delta t)|^2 f_j(\Delta t)\, d(\Delta t).$$

The modulus of the score represents the overall priority of the action, and the phase θ_j provides timing information.

Table 1 shows an example of the impact functions for four actions at selected horizons. The amplitudes are the values of $f_j(\Delta t)$ at each horizon, and the phase column is the constant θ_j for each action.

Note: The negative horizons represent the impact of the action on reconciling with past experiences, while positive horizons represent future-oriented contributions.

Past — Duration Horizon Δt — Future

Chron. Time t

Action	-1 mo.	-1 wk.	-1 day	0	+1 day	+1 wk.	+1 mo.	Phase θ_j (rad)
Morning run	0.1	0.2	0.3	0.7	0.8	0.6	0.3	0.1
Project work	0.3	0.4	0.3	0.5	0.3	0.9	0.7	0.5
Creative writing	0.5	0.5	0.4	0.5	0.4	0.5	0.8	1.2
Family time	0.7	0.8	0.9	0.9	0.9	0.4	0.6	-0.3

Table 1: Impact functions $v_j(\Delta t) = f_j(\Delta t)e^{i\theta_j}$ for example actions at selected duration horizons. The horizontal arrow shows the symmetric temporal dimension Δt, while the vertical arrow indicates the progression of chronological time t in which the field $\Psi(t, \Delta t)$ evolves.

As chronological time t advances, the present moment—defined as $\Delta t = 0$—traces a diagonal through the $(t, \Delta t)$ space. Yesterday's future becomes today's present, and today's present becomes tomorrow's past. In this representation, "you" are the diagonal. The lived present is not a point, but a trajectory. As time flows forward, your experience slides along the diagonal of the temporal field, transforming anticipated futures into lived moments, and lived moments into memory. Your identity is this continuous becoming—the moving point where duration meets chronology. The future progresses toward us, the past accumulates behind us, and we exist — moment by moment — on the temporal diagonal where possibility becomes memory.

3 Philosophical Foundations

3.1 Identity Calculus: The Field Equation

Equation 1 operationalizes Heideggerian *being-towards-possibilities* and *being-from-past* through field theory [11]. The second derivative in Δt acts as a diffusion operator in the full duration space, while the imaginary unit i ensures unitary evolution. The dispersion relation $\omega = k^2$ (from

$\Psi \sim e^{i(k\Delta t - \omega t)}$) shows that different temporal harmonics evolve at different rates, modeling how past memories, present awareness, and future anticipations naturally dephase and rephase in identity formation.

3.2 Productivity Reimagined

Traditional productivity systems become special cases [2, 14]:

- **GTD**: $\partial^2_{\Delta t}\Psi = 0$ (flat symmetric duration distribution)
- **Eisenhower Matrix**: $\hat{V}_j$ with eigenvalues $\{0, 1\}$ (binary operators)
- **Time blocking**: Projection onto eigenstates of Δt operator
- **Reflective journaling**: Explicit consideration of $\Delta t < 0$ components

3.3 The Hermeneutic Cycle: A Labeling of Desires

The Hermeneutic Cycle provides labels on $\Psi(t, \Delta t)$ for the dynamic interplay of desires filled with value across the temporal continuum. Each label corresponds to an aspect of how desires manifest, transform, and are understood. We also indicate where in the horizon these labels may appropriately exist:

1. **Desire** $\Delta t < 0$: What is wanted – the raw amplitude distribution across positive and negative duration horizons.
2. **Value** $\Delta t < 0$: The satisfaction of desire – the phase alignment that makes certain configurations meaningful across time directions.
3. **Aesthetic Expression** $\Delta t < 0$: The emotion expressed – the felt quality of phase relationships between past-influenced and future-oriented desires.
4. **Meaning** $t, \Delta t = 0$: The connection between internal and external – the interference pattern between subjective desire and objective possibility across temporal directions.
5. **Resolve** $t < 0$: The feeling of physical expression – the commitment that collapses superposition into action informed by both history and anticipation.
6. **Define** $t < 0$: The definition of value – the operationalization of desire into measurable metrics across the temporal continuum.
7. **Understand** $t < 0$: The understanding of desire – the analytical reflection that updates the field configuration based on integrated past-future perspective.

Crucially, these are not separate processes but labels we apply to different aspects of desires as they acquire, express, and transform value across the full temporal spectrum. The field $\Psi(t, \Delta t)$ contains all these aspects simultaneously; the cycle describes our conscious navigation through this multidimensional reality.

From this cycle we can compose a generic representative time-duration matrix:

Duration Horizon Δt $\longleftrightarrow$

Chron. Time t $\downarrow$

	Desire ($\mathbf{\Delta t < 0}$)	**Value** ($\mathbf{\Delta t < 0}$)	**Aesthetic** ($\mathbf{\Delta t < 0}$)	**Meaning** ($\mathbf{\Delta t = 0}$)
Understand ($t < 0$)	0.6	0.4	0.3	0.7
Define ($t < 0$)	0.7	0.5	0.4	0.8
Resolve ($t < 0$)	0.8	0.6	0.5	0.9
Meaning ($t = 0$)	0.9	0.7	0.6	1.0

Table 2: Cross-temporal matrix showing how chronological actions at time t manifest across duration phases at horizon Δt. The diagonal shows increasing intensity toward present meaning.

3.4 Field-Theoretic Value Operators: The Pauli Framework Generalization

To extend this framework to the field-theoretic formulation with symmetric duration space while preserving mathematical rigor, we introduce **value spin density operators** that act on the two-component desire field.

3.4.1 Value Spin Density Operators

We define the **value spin density operators** $\hat{s}_i(t, \Delta t)$ as bilinears in the field:

$$\hat{s}_i(t, \Delta t) = \Psi^\dagger(t, \Delta t)\, \sigma_i\, \Psi(t, \Delta t), \quad i = x, y, z,$$

where σ_i are the standard Pauli matrices [10]. These are **local operators** that measure value properties at specific duration horizons (both past and future).

The corresponding **total value spin operators** are obtained by integration over the full duration space:

$$\hat{S}_i = \int_{-\infty}^{\infty} \hat{s}_i(t, \Delta t)\, d(\Delta t).$$

These operators satisfy the $su(2)$ Lie algebra:

$$[\hat{S}_i, \hat{S}_j] = 2i\varepsilon_{ijk}\hat{S}_k,$$

which leads to the **temporal uncertainty principle** [5, 15]:

$$\Delta S_x \cdot \Delta S_z \geq |\langle S_y \rangle|.$$

3.4.2 Physical Interpretation

1. $\hat{S}_z$ - The "What" Operator: Measures the population difference between the two desire modes integrated over all time: $\hat{S}_z = \int_{-\infty}^{\infty} \left(|\Psi_1|^2 - |\Psi_2|^2\right) d(\Delta t)$.

2. $\hat{S}_x$ - The "Why" Operator: Measures quantum coherence between desire modes across temporal directions: $\hat{S}_x = \int_{-\infty}^{\infty} \left(\Psi_1^* \Psi_2 + \Psi_2^* \Psi_1\right) d(\Delta t)$.

3. $\hat{S}_y$ - The "Are You Sure?" Operator: Measures the self-consistency of desire superpositions across past and future: $\hat{S}_y = i \int_{-\infty}^{\infty} (\Psi_2^* \Psi_1 - \Psi_1^* \Psi_2)\, d(\Delta t)$.

3.4.3 Hermeneutic Correspondence

Operator	Value Question	Hermeneutic Mode
$\hat{S}_z$	What?	Desire, Understand
$\hat{S}_x$	Why?	Value, Define
$\hat{S}_y$	Are you sure?	Aesthetic Expression, Resolve

4 Mathematical Foundations

4.1 Derivation from First Principles

Equation 1 can be derived from multiple independent principles [21, 14]:

1. **Information Conservation**: Requiring $\frac{d}{dt} \int_{-\infty}^{\infty} |\Psi|^2 d(\Delta t) = 0$ forces the generator to be anti-Hermitian.

2. **Scale Invariance**: The Laplacian $\partial_{\Delta t}^2$ is the simplest scale-invariant operator for smooth fields.

3. **Temporal Symmetry**: Translation invariance in t and Δt eliminates lower-order terms.

4. **Minimum Description Length**: The equation minimizes descriptive complexity while preserving information.

5. **Temporal Parity Symmetry**: The equation is invariant under $\Delta t \to -\Delta t$, respecting the symmetry between past and future in identity formation.

4.2 Justification of the Field Equation

The field equation $i\partial_t \Psi = \partial_{\Delta t}^2 \Psi$ emerges as the simplest possible dynamical law consistent with the fundamental symmetries of lived temporality. It respects translation invariance in both chronological time t (the laws of identity do not depend on when you ask) and duration offset Δt (no inherent privilege to any particular temporal horizon, past or future), while the second-order derivative in Δt is the minimal scale-invariant operator that ensures smooth, coherent propagation across the temporal continuum.

Crucially, the imaginary unit i is not an arbitrary choice but a structural necessity: it renders the generator anti-Hermitian, guaranteeing unitary evolution and the conservation of total identity salience $\int_{-\infty}^{\infty} |\Psi|^2 d(\Delta t)$ [13, 7]. This conservation law formalizes the existential intuition that while we may redistribute attention and reinterpret narratives across time, we never gain or lose the fundamental substance of selfhood–we remain continuously ourselves even through transformation, carrying our past forward into our future.

Phenomenologically, the equation captures the essential dynamics of how we experience identity across time. The diffusive term $\partial_{\Delta t}^2 \Psi$ models the natural spreading of focus from immediate concerns to broader horizons in both temporal directions, mirroring the psychological process by which

urgent preoccupations gradually integrate into a more balanced temporal perspective that includes both memory and anticipation. Simultaneously, the complex phase evolution enables interference between possible futures and reinterpretations of the past, explaining why some decisions feel resonant (constructive interference) and others paralyzing (destructive interference) based on their alignment with our temporal narrative [5, 16]. Thus the equation does not merely describe identity statically; it mathematically enacts the very process of becoming–a continuous, coherent flow of meaning through the landscape of duration that is both predictably structured and creatively open.

4.3 Solutions and Their Interpretation

The general solution via Fourier transform over the full real line:

$$\Psi(t, \Delta t) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \bar{\Psi}(k, 0) e^{i(k\Delta t + k^2 t)} \, dk$$

exhibits quadratic dispersion $\omega = k^2$, causing temporal spreading and phase evolution symmetrically in both temporal directions.

For Gaussian initial conditions centered at any Δt:

$$\Psi(t, \Delta t) = \frac{1}{\sqrt{1 + i\tau}} \exp\left[-\frac{(\Delta t - \Delta t_0)^2}{2\sigma^2(1 + i\tau)} \right], \quad \tau = \frac{2t}{\sigma^2},$$

demonstrates both spreading in Δt and phase rotation in the complex plane, whether centered in past, present, or future.

4.4 Physical Interpretation of Duration as Position

The treatment of $\Delta t \in (-\infty, \infty)$ as a spatial analogue is justified by [8, 20, 22, 6]:

- **Cognitive Mapping**: Neural representation of time uses spatial metaphors symmetrically (left/right or backward/forward)
- **Mathematical Isomorphism**: Both support gradient flows and conservation laws on unbounded domains
- **Phenomenological Extension**: We experience ourselves as temporally extended beings with both history and potential
- **Interference Patterns**: Potential futures and reinterpreted pasts interfere like waves in space
- **Temporal Parity**: The symmetry between past and future in memory and anticipation mirrors spatial reflection symmetry

5 Empirical Implications

The extended theory predicts testable phenomena:

1. **Temporal Spreading**: Identity focus naturally diffuses across past and future horizons at rate $\propto t^{1/2}$ [23].

2. **Interference Effects**: Decision difficulty correlates with phase differences between competing futures **and** unresolved past experiences [5].
3. **Phase Coherence**: Life satisfaction correlates with smooth phase gradients across both negative and positive Δt [19].
4. **Temporal Symmetry Breaking**: Psychological health correlates with balanced field amplitudes in past and future domains [1].
5. **Narrative Consistency**: The degree to which past and future field configurations constructively interfere predicts sense of life coherence [17].

6 Conclusion

The equation $i\partial_t \Psi = \partial^2_{\Delta t} \Psi$ defined over $\Delta t \in (-\infty, \infty)$ provides a complete foundational formalism for identity dynamics, transforming the full duration continuum into a dimension across which desire evolves unitarily. This extended framework bridges physical conservation laws with phenomenological experience, offering a mathematically precise yet experientially resonant model of becoming that honors both our historicity and our potentiality. By treating identity as a field rather than a vector over the complete temporal spectrum, we capture interference, diffusion, and phase coherence–essential features of how we navigate temporal possibility while maintaining existential continuity between what we have been and what we may become.

Acknowledgments

This synthesis draws from Bergson's duration [3], Heidegger's temporality [11], and Dewitt Henry Parker's philosophy of value and evolves into a quantum field analog from symmetric partial differential equations.

Interpretive Position

Although the identity field Ψ is not posited as a physical quantum field, it is nonetheless assumed to be physically instantiated in neural processes. The present framework is agnostic with respect to the specific neurobiological mechanisms involved, but assumes that large-scale, recurrent brain dynamics give rise to stable, temporally extended patterns that encode memory, anticipation, and value [6, 7]. These patterns are classical in their physical substrate, yet subject to constraints–coherence across incompatible possibilities, conservation of salience, and contextual dependence–that render their effective description non-classical in form [5, 15]. In this sense, the quantum-like structure of the theory reflects the organization of information in the brain rather than microscopic quantum processes within it.

"If it disagrees with experiment, it's wrong" - Feynman [9]

A Numerical Implementation

The evolution operator can be computed efficiently via Fourier transform over the full real line:

$$\Psi(t + \delta t, \Delta t) = \mathcal{F}^{-1}\left[e^{-i\delta t\, k^2} \mathcal{F}[\Psi(t, \Delta t)]\right],$$

where $\mathcal{F}$ denotes Fourier transform in Δt over $\mathbb{R}$.

B Connection to Original Framework

The original temporal vector $\mathbf{T}(t) = \sum c_i(t)\mathbf{d}_i$ becomes [16]:

$$\mathbf{T}(t) = \int_{-\infty}^{\infty} |\Psi(t, \Delta t)|^2 \, \mathbf{d}(\Delta t) \, d(\Delta t),$$

where $\mathbf{d}(\Delta t)$ are desire basis functions weighted by symmetric duration, capturing both memorial and anticipatory dimensions of identity.

Related Work

This work builds upon and extends several established traditions. Philosophically, it formalizes Bergson's duration [3] and Heidegger's temporality [11] using field-theoretic methods. Neuroscientifically, it aligns with findings on symmetric neural encoding for past and future events [1, 18]. Mathematically, it extends quantum cognition models [5, 15] to continuous temporal fields, and connects to neural field theories [22, 6]. Unlike previous approaches, our formulation treats duration symmetrically across past and future within a unitary evolution framework, providing a complete field-theoretic description of identity dynamics across the temporal continuum.

References

[1] Donna Rose Addis, Alana T Wong, and Daniel L Schacter. Remembering the past and imagining the future: Common and distinct neural substrates during event construction and elaboration. *Neuropsychologia*, 45(7):1363–1377, 2007.

[2] David Allen. *Getting Things Done: The Art of Stress-Free Productivity.* Penguin Books, 2001.

[3] Henri Bergson. *Duration and Simultaneity.* Bobbs-Merrill, 1922.

[4] Gregory S Berns and Sara E Moore. A neural predictor of cultural popularity. *Journal of Consumer Psychology*, 22(1):154–160, 2012.

[5] Jerome R Busemeyer and Peter D Bruza. *Quantum Models of Cognition and Decision.* Cambridge University Press, 2012.

[6] Stephen Coombes. Waves, bumps, and patterns in neural field theories. *Biological Cybernetics*, 93(2):91–108, 2005.

[7] Antonio Damasio. *Self Comes to Mind: Constructing the Conscious Brain.* Pantheon Books, 2010.

[8] David M Eagleman. Brain time. In *What's next? Dispatches on the future of science*, pages 183–200. Vintage, 2009.

[9] Richard P Feynman, Robert B Leighton, and Matthew Sands. *The Feynman Lectures on Physics, Vol. III.* Addison-Wesley, 1965.

[10] David J Griffiths. *Introduction to Quantum Mechanics.* Pearson Prentice Hall, 2nd edition, 2005.

[11] Martin Heidegger. *Being and Time.* Harper & Row, 1927.

[12] Edmund Husserl. *On the Phenomenology of the Consciousness of Internal Time*. Kluwer Academic Publishers, 1991.

[13] William James. *The Principles of Psychology*. Henry Holt and Company, 1890.

[14] Daniel Kahneman. *Thinking, Fast and Slow*. Farrar, Straus and Giroux, 2011.

[15] Andrei Khrennikov. *Ubiquitous Quantum Structure: From Psychology to Finance*. Springer, 2010.

[16] Emmanuel M Pothos and Jerome R Busemeyer. Can quantum probability provide a new direction for cognitive modeling? *Behavioral and Brain Sciences*, 36(3):255–274, 2013.

[17] Paul Ricoeur. *Time and Narrative, Vol. 1*. University of Chicago Press, 1984.

[18] Daniel L Schacter, Donna Rose Addis, and Randy L Buckner. Remembering the past to imagine the future: the prospective brain. *Nature Reviews Neuroscience*, 8(9):657–661, 2007.

[19] Martin EP Seligman, Peter Railton, Roy F Baumeister, and Chandra Sripada. Navigating into the future or driven by the past. *Perspectives on Psychological Science*, 8(2):119–141, 2013.

[20] Thomas Suddendorf and Michael C Corballis. The evolution of foresight: What is mental time travel, and is it unique to humans? *Behavioral and Brain Sciences*, 30(3):299–313, 2007.

[21] Steven Weinberg. *The Quantum Theory of Fields, Vol. I*. Cambridge University Press, 1995.

[22] Hugh R Wilson and Jack D Cowan. Excitatory and inhibitory interactions in localized populations of model neurons. *Biophysical Journal*, 12(1):1–24, 1972.

[23] Gal Zauberman, B Kyu Kim, Selin A Malkoc, and James R Bettman. Discounting time and time discounting: Subjective time perception and intertemporal preferences. *Journal of Marketing Research*, 46(4):543–556, 2009.